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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,997	02/20/2002	Sabine Steck	1999P2607	6138

7590 05/22/2003

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EXAMINER

CHEN, JACK S J

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 05/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
10/078,997

Applicant(s)
Steck et al.

Examiner
Jack Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Apr 21, 2003
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above, claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 6 6) ☐ Other:

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DETAILED ACTION

1. In response to the communications dated April 21, 2003, claims 1-10 are active in this application.
2. Applicant's election of Species I (claims 1-8) in Paper No. 8 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Accordingly, claims 9-10 are withdrawn from further consideration.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

4. The information disclosure statement filed February 20, 2002 has been considered.

Oath/Declaration

5. Oath/Declaration filed on February 20, 2002 through June 4, 2002 have been considered.

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Specification

6. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
7. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
8. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Regarding claims 2-6, the claimed limitation are not supported by the specification (i.e., within the description of the preferred embodiments sections).

Claim Objections

9. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. For example, claim 1 recites "undoped silicon oxide" and claim 2 recites "the doping of the undoped silicon oxide"; therefore, claim 2 fails to further limit the subject matter of the previous claim 1.

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Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golden et al., U.S./5,618,751 in view of Tsai, U.S./5,913,132.

Golden et al. disclose a method for forming a trench with a buried plate, which comprises forming a trench 210 in a substrate 110 (fig. 2), the trench having a sidewall, an upper region, and a lower region (fig. 2); forming an undoped silicon oxide layer 320 (Re claim 6, undoped glass, such as TEOS having a thickness of 10-20 nm) on the trench sidewall in the upper and lower region of the trench (fig. 3, col. 4, lines 20-30); forming a doped silicate glass 310 (Re

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claim 3, arsenic doped glass) fill in the upper and lower regions of the trench (fig. 3; col. 4, lines 15-25); removing the doped silicate glass fill and the undoped silicon oxide layer from the upper region of the trench (fig. 5); and increasing temperature to diffuse dopant from the doped silicate glass fill into the substrate to form a buried plate 620 in the substrate in the lower region of the trench (fig. 6; col. 6, lines 30-45), see figs. 1-7, cols. 1-8 for more details.

Re claims 7 and 8, Golden et al. further shows filling the trench having the doped silicate glass fill with varnish 330 (fig. 3, i.e. resist); removing the varnish in the upper region of the trench (fig. 4); removing the doped silicate glass fill and the undoped silicon oxide layer in the upper region of the trench (fig. 5); removing remaining varnish from the trench (fig. 6); depositing an oxide cover layer 610 (fig. 6) and then increasing temperature to diffuse dopant into the substrate (fig. 6); and removing the oxide cover layer, and removing the doped silicate glass fill and the undoped silicon oxide layer from the lower region of the trench (fig. 7).

Golden et al. disclosed above; however, Golden et al. are silent to depositing the undoped silicon oxide layer immediately prior to forming the doped silicate glass fill and diffusing the dopant through the undoped silicon oxide layer into substrate to form the buried plate.

Tsai teaches a method for forming a semiconductor device, which comprises forming a trench 104 in the substrate (fig. 3); forming oxide 105 (fig. 15) along the sidewall of the trench; forming doped silicate glass 200 (BPSG, PSG, BSG) immediate after forming the oxide (fig. 15); increasing temperature to diffuse dopant from the doped silicate glass into the substrate through

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the oxide layer to form a doped region 207 in the substrate (fig. 21; col. 4, lines 5-30), see figs. 1-21, cols. 1-8 for more details.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the oxide immediately prior to forming the doped silicate glass (which is diffusing the dopant through the oxide into the substrate) as taught by Tsai in the method of Golden et al. in order to lower the sealing temperature as compared with an undoped dielectric and lower the substrate defects (see Tsai, col. 4, lines 44-50 and col. 5, lines 10-15).

Further in this regard, the sequence/reversal step: Absent a showing of unexpected result, a change in sequence involves routine optimization of process of prior art and would have been obvious to one skilled in the art at the time the invention was made. A change in sequence/reversal of process steps is obvious under 35 USC 103 (ex parte Rubin, 128 USPQ 440 (Bd. App. 1959)). See also in re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA).

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Golden et al. and Tsai by selecting the suitable concentration for the undoped oxide and doped silicate glass, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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Conclusion


12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lin, U.S./4,604,150 teaches diffusing dopants through the oxide into the substrate to form the buried plate.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (703) 308-5838. The examiner can normally be reached on Monday-Friday (alternate Monday off) from 8:30 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (703)308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.


Jack Chen


JACK CHEN
PATENT EXAMINER

May 19, 2003